

TITLE

**METHOD OF AND APPARATUS FOR SETTING AND ADJUSTING A
PRINT LOCATION OF A PRINTER**

CLAIM OF PRIORITY

[0001] This application makes reference to, incorporates the same herein, and claims all benefits accruing under 35 U.S.C. §119 from my application *METHOD FOR SETTING AND CONTROLLING PRINTING POSITION OF THE PRINTER* filed with the Korean Industrial Property Office on 20 January 2001 and there duly assigned Serial No. 3416/2001.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present invention relates to a method of controlling a printer, and more particularly, to a method of setting and adjusting the print location of a printer, by which information about a print location of a printer to identify where printing will start is set as an option by a user, and a printer is controlled such that a document is printed out according to the set print location information.

Description of the Related Art

[0003] Generally, a printer is used in combination with a computer. After having received print setup information and print data transferred from the computer, the printer runs a built-in printer drive program and controls printing such that print data is printed on a paper loaded

1 according to the print setup information. For a user to change a location for printing on a paper,
2 a document margin setup function has been used.

3 **[0004]** However, a shortcoming of a printer according to conventional art is that it is difficult
4 to produce prints of a standardized format. Furthermore, it is difficult for a user to accurately
5 determine a print location when using a document margin setting function. Conventional
6 printers typically have a problem with respect to accurately printing a portion of a text or image
7 which a user desires to print on a paper by scaling up or down a document.

8 SUMMARY OF THE INVENTION

9 **[0005]** To solve the above problems, it is an objective, among other objectives, of the present
10 invention to provide a method of setting and adjusting a print location of a printer, by which a
11 user directly defines the print location for printing by the printer and the printer is controlled such
12 that an image or text, for example, to be printed is printed out exactly at a desired position on a
13 paper using information about the defined print location and margins.

14 **[0006]** To achieve the above objective, and other objectives, of the present invention, a
15 method of setting the print location for printing by a printer is provided. The method includes
16 the steps of: (a) determining whether or not a print location setting command of the printer is
17 input; (b) outputting a print location setting menu screen for setting the print location for printing
18 by the printer when the print location setting command is input; (c) inputting print location
19 information in the print location setting menu screen by using an input means; and (d) storing the
20 print location information entered in the step (c) in a memory.

1 **[0007]** The present invention also provides a method of adjusting the print location for printing
2 by a printer. The method of adjusting the print location for printing by a printer includes the
3 steps of: (a) receiving printer print location information about a print location for printing by a
4 printer and margin information about margins for printing from a computer of a user
5 communicating with the printer; (b) determining a print location for printing on a paper or
6 printing medium loaded on the printer using the printer print location information and the margin
7 information; and (c) controlling the position of a printer head for the printer according to the
8 print location for printing determined in the step (b).

BRIEF DESCRIPTION OF THE DRAWINGS

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10 **[0008]** A more complete appreciation of the invention, and many of the attendant advantages
11 thereof, will be readily apparent as the same becomes better understood by reference to the
12 following detailed description when considered in conjunction with the accompanying drawings,
13 in which like reference numerals indicate the same or similar components, and wherein:

14 **[0009]** Fig. 1 illustrates a configuration of a printer system to which the present invention is
15 applied;

16 **[0010]** Fig. 2 is a flowchart illustrating a method of setting and adjusting the print location for
17 printing by a printer according to the present invention;

18 **[0011]** Fig. 3 is a detailed flowchart illustrating a process of setting the print location shown in
19 Fig. 2;

20 **[0012]** Fig. 4 is a detailed flowchart illustrating a process of determining the print location

shown in Fig. 2;

[0013] Fig. 5A is a detailed configuration illustrating a print location setting menu screen for setting the print location for printing by the printer according to the present invention; and

[0014] Fig. 5B is a diagrammatic illustration of a print boundary screen in the print location setting menu screen of Fig. 5A for illustrating the process of determining the print location of Fig. 4.

DETAILED DESCRIPTION OF THE INVENTION

[0015] Referring now to Fig. 1, a printer system 100, to which the present invention is applied, includes a computer 10, a printer 20, and a connector 30, connector 30 coupling the computer 10 to the printer 20 for communication of data, instructions and program information, for example. More specifically, the computer 10 includes a personal computer (PC) controller 10-1, a program memory 10-2, a data memory 10-3, a monitor 10-4, an input device 10-5, and an input/output (I/O) port 10-6. The printer 20 includes an I/O port 20-1, a printer controller 20-2, a printer program memory 20-3, a data memory 20-4, a manipulation panel 20-5 that includes a power key P of the printer 20 and various function keys F corresponding to various functions for the printer 20, and a printer engine 20-6 including a printer head 20-6a. The connector 30 couples input/output port 10-6 of the computer 10 with input/output port 20-1 of the printer 20.

[0016] The typical operation of the printer 20 will now be described. Various word processor programs and graphic programs stored in the program memory 10-2 are executed by the PC controller 10-1 of the computer 10, so as to create file data. Then, when a print start command is

1 selected by the user after the type of paper and margins, for example, are determined, printer
2 control data containing information such as the type of paper and margins stored in the data
3 memory 10-3 and the file data to be printed are transmitted to the printer 20 through the I/O port
4 10-6 and the connector 30.

5 **[0017]** Then, the printer controller 20-2 of the printer 20 stores the printer control data and the
6 file data to be printed transmitted through the I/O port 20-1 in the data memory 20-4. The printer
7 controller 20-2 runs a printer operating program stored in the printer program memory 20-3 so
8 that the transmitted file data can be printed according to the setting conditions of information
9 about the type of paper and margins contained in the printer control data, so as to execute
10 printing by controlling the printer engine 20-6.

11 **[0018]** Referring now to Figs. 2 through 5B, a method of setting and adjusting the print
12 location for printing by the printer 20 according to the present invention executed on the printer
13 system 100 of Fig. 1 will now be described. Referring first to Fig. 2, the user of computer 10 in
14 printer system 100, for example, drives a word processor or graphic program by means of the
15 input device 10-5, such as including a keyboard and a mouse, to create a document or a graphic
16 file. Then, before starting of printing of the created file, the user specifies or defines margins for
17 the document to be printed by means of the input device 10-5 and stores the specified margins in
18 the data memory 10-3 at step S201. In the event that the specified margins of the document
19 make no change in the course of creating the file, the margins defined as an initial value are
20 maintained.

21 **[0019]** The user then specifies the print location for printing by the printer 20 using a printer

1 control program stored in the program memory 10-2 at step S202. The process of setting the
2 print location or printing by the printer 20 performed in step S202 will now be described in detail
3 with reference to Fig. 3.

4 **[0020]** Referring now to Fig. 3, in setting the print location for printing by the printer 20 (step
5 S202), it is determined whether or not the print location setting command of the printer 20 for
6 setting a printer location for printing is input to the PC controller 10-1 such as by manipulating
7 keys of the input device 10-5 at step S301. If the print location setting command of the printer
8 20 is input to the PC controller 10-1, the process proceeds to step S302 and the PC controller 10-
9 1 runs the printer control program stored in the program memory 10-2 and outputs to the monitor
10 10-4 a print location setting menu screen 500 for the user to set the print location as illustrated in
11 Fig. 5A at step S302. If the print location setting command is not input to the PC controller 10-1,
12 the process waits at step S301.

13 **[0021]** Continuing with reference to Figs. 3, 5A and 5B, as shown in Fig. 5A, the print
14 location setting menu screen 500 includes an input window i for the user to directly specify X-
15 axis and Y-axis coordinate values of a print starting point P1 and a print end point P2. An edge
16 boundary screen a for displaying edge boundary screen information of a printing medium, such as
17 a printing paper, and a print boundary screen b for printing by the printer 20 for displaying print
18 boundary screen information including, for example, a print location area L for printing, margin
19 information for printing, the margin information including a top margin Mt, a bottom margin
20 Mb, a left margin Ml and a right margin Mr, and a printing starting point P1 and a printing end
21 point P2 including coordinate information or location information for P1, P2, are displayed

1 together on print location setting menu screen 500 such that the print boundary screen b for
2 printing by the printer 20 is automatically changed according to the print starting point P1(Xst,
3 Yst) and the print end point P2(Xep, Yep) input by the user. Alternatively, using print location
4 adjustment cursors c1, c2, d1, and d2, the print location area L can move up and down and from
5 side to side by checking changes of the print location area L. Furthermore, the print location
6 setting menu screen 500 includes use of a key input program by printer controller 20-2 stored in
7 printer program memory 20-3 for returning to the print location area L set as default values, with
8 window j of print location input screen 500 as a cursor input window for use by the user in
9 relation to setting or cancelling default values for the print location area or margins by using an
10 input means, such as a mouse of input device 10-5. Thus, when the user determines print
11 location information by using the print location adjustment cursors c1, c2, d1, and d2 or by using
12 the input window i and positions the cursor K and clicks using a mouse of input device 10-5, for
13 example, on a set portion of the input window i or the print boundary screen b to input print
14 location information at step S303, the PC controller 10-1 stores the printer print location
15 information set by the user in the data memory 10-3 at step S304, and the process then proceeds
16 to END step S305. The process of setting the print location of the printer 20 in step S202 is
17 therefore executed in this way, for example.

18 **[0022]** Continuing with reference to Fig. 2, when a print command is input by means of the
19 input device 10-5 after designating a file to be printed, information about the print location of the
20 printer 20 set by the user in step S202 and information about margins set during the creation of
21 the file to be printed are transmitted to the I/O port 20-1 of the printer 20 through the I/O port 10-

6 and the connector 30 at step S203. In this case, the file data to be printed is also transmitted to the printer 20 together with the margin information and printer print location information.

[0023] After storing the file data to be printed, the margin information, and the printer print location information in the data memory 20-4, the printer controller 20-2 runs the printer operating program stored in the printer program memory 20-3 and executes a process of determining the print location of a paper loaded on the printer 20 using the printer print location information and the margin information in step S204 that has been stored in the data memory 20-4. One embodiment for determining the print location is illustrated in Fig. 4. The process of determining the print location by the printer controller 20-2 using the printer operating program stored in the printer program memory 20-3 and using the printer print location information and the margin information in data memory 20-4 in step S204 shown in Fig. 2, will now be described with reference to Figs. 4 and 5B.

[0024] Fig. 5 B illustrates diagrammatically the print boundary screen b of print location setting menu screen 500 of Fig. 5A with reference to a positive X-axis direction and a positive Y-axis direction with respect to the X and Y axis coordinates for the X-axis minimum value X_{min} , the Y-axis minimum value Y_{min} , the X-axis maximum value X_{max} and the Y-axis maximum value Y_{max} in relation to the X and Y axis coordinates system, as illustrated in Fig. 5B. Also, in the diagrammatic illustration of the print boundary screen b in Fig. 5B there is illustrated in relation to the X and Y coordinate system the X and Y coordinates respectively for the X-axis lower limit X_s and the Y-axis lower limit Y_s corresponding to the print starting point P1, and the X and Y axis coordinates respectively corresponding to an X-axis upper limit X_e and a Y-axis

1 upper limit Ye corresponding to the print end point P2, in accordance with the process set forth
2 in Fig. 4. The top margin Mt, the bottom margin Mb, the right margin Mr and the left margin Ml
3 illustrated in Fig. 5B, as well as in Fig. 5A, are positive values or absolute values of the distance
4 measurement of these margins respectively in the X-axis direction and in the Y-axis direction,
5 with the right margin Mr and the left margin Ml being a measurement of a corresponding
6 distance in the X-axis direction, and with the top margin Mt and the bottom margin Mb
7 respectively being a measurement of a distance in the Y-axis direction.

8 **[0025]** Referring now to Figs. 4 and 5B, in step S204 an X-axis lower limit Xs, which is a
9 result of adding a left margin Ml contained in the margin information to an X-axis minimum
10 value Xmin contained in the printer print location information, and an X-axis upper limit Xe,
11 which is a result of subtracting a right margin Mr contained in the margin information from an
12 X-axis maximum value Xmax contained in the printer print location information, are each
13 determined, such as by being calculated at step S401. For example, with reference to Fig. 5B and
14 step S401 in Fig. 4, for example, when the X-axis and Y-axis coordinates for Xmin and Ymin are
15 set at (0, 0) with respect to the X and Y positive coordinate system illustrated in Fig. 5B and the
16 left margin Ml and the right margin Mr each have a positive or absolute value distance measure
17 along the X-axis of 1, applying step S401, Xs is equal to Xmin + Ml or Xs equals 0+1=1 as the
18 X-axis coordinate for Xs. Likewise, assuming the X-axis and Y-axis coordinate values for Xmax
19 and Ymax, for example, are (6, 6), then Xe = Xmax - Mr or Xe = 6 - 1 = 5 as the X-axis
20 coordinate for Xe.

21 **[0026]** Continuing with reference to Figs. 4 and 5B, a Y-axis lower limit Ys, which is a result

1 of adding a top margin M_t contained in the margin information to an Y-axis minimum value
2 Y_{min} contained in the printer print location information, and an Y-axis upper limit Y_e , which is
3 a result of subtracting a bottom margin M_b contained in the margin information from an Y-axis
4 maximum value Y_{max} contained in the printer print location information, are each determined,
5 such as by being calculated at step S402. Continuing with the previous example from step S401,
6 referring to step S402 and Fig. 5B, when the X-axis and Y-axis coordinate values of X_{min} and
7 Y_{min} are (0, 0) and the X-axis and Y-axis coordinate values of X_{max} and Y_{max} are (6, 6), for
8 example, and with the positive or absolute value distance along the Y-axis of the top margin M_t
9 and the bottom margin M_b each being a value of 1, applying step S402 of Fig. 4, the Y-axis
10 coordinate value of $Y_s = Y_{min} + M_t$ which equals $0 + 1 = 1$, and the Y-axis coordinate value of
11 $Y_e = Y_{max} - M_b$ which equals $6 - 1 = 5$. Therefore, in the example, the X-axis and Y-axis
12 coordinates of X_s and Y_s are (1, 1) and the X-axis and Y-axis coordinates of X_e and Y_e are (5,
13 5). The coordinate values for X_s and Y_s and X_e and Y_e respectively determined from steps S401
14 and S402 will now be used in the comparison step S403 to determine whether the print location
15 value, such as for the print starting point P1 and the print end point P2 will require adjustment.
16 Continuing with step S403 in Fig. 4, then, the X-axis lower limit X_s and the X-axis upper limit
17 X_e determined in step S401 are compared with each other at step S403, and the Y-axis lower
18 limit Y_s and the Y-axis upper limit Y_e determined in step S402 are compared with each other at
19 step S403.

20 **[0027]** When, as a result of the comparison at step S403, the X-axis lower limit X_s is greater
21 than or equal to the X-axis upper limit X_e or when the Y-axis lower limit Y_s is greater than or

1 equal to the Y-axis upper limit Y_e , the process or processes of automatically changing a
2 respective one or more of the left, right, top or bottom margins are performed at step S404; and
3 when not, the process proceeds to END at step S406 through step S405A where the X-axis lower
4 limit X_s and the Y-axis lower limit Y_s are respectively determined as the X-axis and Y-axis
5 coordinates of the print starting point P1 (X_{st} , Y_{st}). That is, in the event that the defined margins
6 and print location value as the print starting point, are used when the X-axis lower limit X_s is
7 greater than or equal to the X-axis upper limit X_e or when the Y-axis lower limit Y_s is greater
8 than or equal to the Y-axis upper limit Y_e , printable area does not exist for printing on a print
9 medium, such as paper. Thus, the above problem can be advantageously solved by changing the
10 margin information to provide a corresponding print location value to that specified by the user.

11 **[0028]** Continuing with reference to Fig. 4, the process of automatically changing the margins
12 in step S404 is a process, for example, that is programmed in the operating program stored in the
13 printer program memory 20-3 and the printer controller 20-2 executes the operating program
14 using the printer print location information and margin information stored in data memory 20-4
15 according to a predetermined rule or predetermined operation such that the right, left, top and
16 bottom margins can be automatically initialized, for example, to a respective initial value or a
17 respective zero position for each of the respective top, bottom, right and left margins according to
18 the predetermined rule or predetermined operation in the operating program stored in the printer
19 program memory 20-3 for setting such initial value or zero position by adjusting X-axis and Y-
20 axis coordinate values defining the respective margins, for each of the respective top, bottom,
21 right and left margins, M_t , M_b , M_r , and M_l . Such zero position or initialized margin values

1 providing appropriate corresponding distances for the margins Mt, Mb, Ml and Mr are measured
2 in the respective X-axis and Y-axis directions, by execution of a predetermined rule in the
3 operating program for the printer 20 to adjust X-axis and Y-axis coordinate positions for the
4 respective margins, such as to provide for the conditions $X_e \geq X_s$ and $Y_e \geq Y_s$ with respect to
5 step S403 of Fig. 4 being satisfied. Alternatively, the predetermined rule in the operating system
6 can adjust the respective distances for the respective margins Ml, Mr, Mt, and Mb by adjusting
7 X-axis, and Y-axis coordinate positions defining the margins, so that a position, other than an
8 initialized position, can be provided for the margins, but also satisfying the criteria $X_e \geq X_s$ and
9 $Y_e \geq Y_s$ with respect to step S403 of Fig. 4. Furthermore, as another example, the process of
10 determining the print location shown in Fig. 4 for printing by the printer 20 on a print medium,
11 such as paper, can be programmed in the operating program stored in the printer program in
12 memory 20-3 and the printer controller 20-2 executes the operating program such that the process
13 flow returns from step S404 to step S401 by reducing the right, left, top and bottom margins at a
14 constant ratio to repeat the above steps S401 through S404 until the right, left, top and bottom
15 margins are found to be acceptable in accordance with the above discussed criteria $X_e \geq X_s$ and
16 $Y_e \geq Y_s$ with respect to step S403, and the process, in such case, then proceeds to END step
17 S406 through step S405A where the X-axis lower limit X_s and the Y-axis lower limit Y_s , finally
18 determined from such repeating of steps S401 and S402, are determined as the coordinates of the
19 print starting point P1 (X_{st} , Y_{st}).

20 **[0029]** Continuing with reference to Fig. 4, after having performed the process of
21 automatically changing the margins during step S404, the process, proceeds to step S405 where a

print starting point P1 is determined as X-axis and Y-axis coordinate values X_{st} , Y_{st} , according to the formulas set forth in step S405. The X-axis print starting point coordinate value X_{st} is determined in step S405 by adding a left margin MI' determined from step S404 to the X-axis minimum value X_{min} . The Y-axis print starting point coordinate value Y_{st} is determined in step S405 by adding the Y-axis minimum value Y_{min} to the top margin Mt' determined in step S404. However, in the "OR" relation of step S403, on the other hand, when the X-axis lower limit X_s is less than the X-axis upper limit X_e , the X-axis lower limit X_s determined in step S401 can be determined as the X-axis coordinate X_{st} of the print starting point P1 in step S405. Also, when the Y-axis lower limit Y_s is less the Y-axis upper limit Y_e , the Y-axis lower limit Y_s determined in the step S402 can be determined as the Y-axis coordinate Y_{st} of the print starting point P1 in step S405. After the print starting point P1 (X_{st} , Y_{st}) has been determined in step S405, the process proceeds to END step S406.

[0030] Continuing with reference to Fig. 2, after having determined the print location through the above described process of Fig. 4 and step S204 of Fig. 2, the process proceeds to step S205 of Fig. 2 where the print controller 20-2 controls the position of the printer head 20-6a of the printer engine 20-6 according to the print location information and margin information, such as P1, P2, Mt , Mt' , Mb , Mr , MI and MI' , determined in step S204 such that the transmitted file data is printed out at a desired position on the loaded print medium, such as a paper, at step S205. The process then proceeds to END step S206. In this way, use of the margin information about the file to be printed and the printer print location information set by the user allows the user to print an image or text, *etc.* to be printed exactly at a desired position on a print medium, such as a

paper.

[0031] The present invention can be implemented in terms of a method, an apparatus, a system, and the like. When the present invention is implemented in software, the elements of the present invention are code segments, for example. Programs or code segments can be stored on a processor-readable recording medium, or can be transmitted by a computer data signal combined with a carrier wave over a transmission medium or a communication network, for example. Examples of the processor-readable medium can include a electronic circuit, a semiconductor memory device, a read only memory (ROM), a flash memory, an erasable ROM (EROM), a floppy disk, an optical disk, a hard disk, an optical fiber medium, air, an electromagnetic field, and a radio frequency (RF) network. The computer data signal can include any of signals that can be transmitted over a transmission medium, such as an electronic network channel, an optical fiber, air, an electromagnetic field, and an RF network.

[0032] As described above, according to the present invention, printing is executed by first setting the print location for printing by a printer set directly by the user and then determining a print starting location considering the set print location information and margin information related to a document. Thus, the present invention advantageously allows various applications for printing a document having the same margins. Furthermore, the present invention allows a desired portion of text data or image data, for example, to be printed out at a designated position on a printing medium, such as printing paper, by scaling up and down a document.

[0033] While there have been illustrated and described what are considered to be preferred embodiments of the present invention, it will be understood by those skilled in the art that

1 various changes and modifications may be made, and equivalents may be substituted for
2 elements thereof without departing from the true scope of the present invention. In addition,
3 many modifications may be made to adapt a particular situation to the teaching of the present
4 invention without departing from the scope thereof. Therefore, it is intended that the present
5 invention not be limited to the particular embodiments disclosed as the best mode contemplated
6 for carrying out the present invention, but that the present invention includes all embodiments
7 falling within the scope of the appended claims.